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ABSTRACT

Educational development in a country should reliably predict the level of wealth and its distribution. Undeveloped societies tend to have highly inegalitarian distribution functions. The development process accelerates this tendency by rewarding wealthy segments of the population that are in a position to invest in the growing economy. Finally, in advanced stages of development, bureaucratic and political structures may reach a point where egalitarian changes in the distributive process can be effected. Education leads to development and increased wealth in the society, but since education enriches individuals, it increases inequality. Three basic areas are explored to test a model relating economic development, education, and inequality: (1) level of economic development; (2) level of educational development; and (3) diversity of economic structures. Using a variety of educational and income statistics, and a measure of development, a Gini index was generated for each of 144 nations. In general, the data support the expected relationship. However, when the sample is divided into three groups based on GNP per capita, this relationship is only seen in advanced developed and undeveloped nations. In developing nations, increasing educational levels are related to increasing wealth, but not to increasing inequality. (MCK)

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Education, Income, and Equality

by
Harmon Zeigler

March 1986

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Education, Income, and Equality

by
Harmon Zeigler

This paper explores the relationships among wealth, the distribution of wealth, and education. It argues that education should predict both wealth and its distribution, measured at the macro level, (with macro-level data assuming the existence of micro-level underlying causes.)

Of course, unless there is a considerable amount of economic product generated in a society, there is very little point of talking either about wealth or its distribution. Further, societies at earlier stages of development tend to have highly inegalitarian distribution functions. The reasons for this are: underdeveloped economic structures tend to be politically undifferentiated and consequently demonstrate little effective political mobilization through such mechanisms as trade unions or mass political parties that could potentially make demands for a wider dispersion of the economic and social product; underdevelopment tends to be bureaucratic as well as economic or political. Thus, even the governmental structure that could be used as a policy tool to expand the dispersion of the economic and social product is absent or inadequate. The poor utilize virtually all of their income for maintenance, while the wealthy require only a small portion of their income for day-to-day expenses, such as food, clothing, and shelter. They can save a large portion of their income. Not only can the poor not save, but they receive no money through investments since they require sizeable commitments of capital.

The development process accelerates this tendency for inegalitarian distributions of social goods by rewarding the already wealthy segments for their investments in a growing economic structure. Also, urbanization and industrialization center much of the new labor and wealth on a few locations, while the rest of society is either neglected or retarded. Finally, as economic growth begins to level off and the desired goal of "development" is reached, the bureaucratic and political development begins to catch up with the economic growth. Since this occurrence comes at a time when presumably there is a stable and diversified economic structure, whatever new demands are made by nascent interest groups are much more likely to be met by established bureaucracy since it not only is equipped with expertise, but also possesses an expanding resource base aimed at enhancing its ability to make changes in the distributive process which might lead to a greater level of equality. The argument that there is diminishing equality at early stages of development is based largely upon the notion that preindustrial societies were highly egalitarian in the sense that virtually everybody tilled for themselves that which they consumed. Such accounts are dismissed by political economists as inaccurate renditions of preindustrial economies. For the most part the treatment of this curvilinear hypothesis in the literature has dealt with the extent to which equality was enhanced by increasing levels of postindustrial development. While there are variants to this argument, in general it characterizes what is often known as the curvilinear hypothesis which relates to the development of equality.

Note the central paradox: education leads to development

which leads to inequality. That which enriches individuals--education--operates to stretch the political system to the limits by inducing inequality. Education, seen from this light, is revolutionary in that it contributes to political instability. This argument is perhaps naive since the relationship between development and equality is influenced by many other factors. Most notable are internal political constraints, such as the bureaucratic and governmental structures as well as the social philosophy of the decision-making elite, and international impingements upon the scope and effectiveness of internal policy making such as alliance structures and trade patterns.

Even with these recognized shortcomings, the basic curvilinear relationship relating development, education, and inequality is a valuable starting point for the investigation of the causes of inequality within nations. The choice of this particular starting point is important for several reasons. First, it has been the cornerstone of much of the extant empirical and theoretical work on inequality. Thus there is a foundation upon which to build future expectations. Second, it is the development process itself, as embodied in the economic successes of Western industrial powers, that has provided a goal--perhaps undesirable--which elites of underdeveloped nations have, though for the most part not singularly, attempted to emulate in order to achieve growth and, when coupled with the appropriate ideology, equity.

Three basic areas will be explored in order to test a model relating economic development, education, and inequality: 1) level of economic development, 2) level of educational development, 3)

diversity in the economic structure.

Operational Measurement Techniques

Using 144 nations, a large number of potential indicators could be generated, although much of the data--especially those from authoritarian and undeveloped countries--are either unreliable or unreported. Indeed, a major portion of energy went into collecting reliable data for such countries to compare them with developed, open societies. Of course, the information is readily available in open, developed nations. Collective or authoritarian governments pose another problem. They require the adjustment of measures of income inequality for various factors of collective or subsidized income which are not accumulated in terms of money (health care, unemployment benefits, social security type programs).

For each of the nations a Gini index was generated, using either the nationally available income statistics or, when necessary, fragmentary data from regional governments, research institutes, and the like. Sector inequality was generated from the most recent available only for the 1960s, but they are used as the best available data. Educational data were gathered on the same basis. We use percent literate, percent high school graduates, proportion of applicants admitted to universities, and the proportion graduated. These variables were rotated to produce a single loading. Development was measured by combining GNP per capita with average GNP growth.

The data indicate that the expected relationships are generally supported. Education raises income and increases inequality. The more education, the less equality. If we look at

nations by level of development (measured by per capita GNP), the realtionships hold. The sample can be divided into three groups, based upon GNP per capita. There are the most developed nations, developing nations, and those mired in poverty. The relationship holds for the first and last groups, but for developing nations there is a loss of correlation, especially when we look at the relationship between income and equity.

The supposed link vanishes, suggesting that in developing countries there is no need to sacrifice growth for equity. Growth does not lead to inequality, nor does it contribute to equality. Education does not play its perverse role in such countries, and investments in education are wise, compared to such investments in developed countries, or in the least developed ones.

Variable	Mean	St.Dev.
INCOME	9177.66	1288.045
EDUC	4.624	.7435601
COLLEGE	16.112	3.021801

Wait ... inverting the matrix ...

Press any key to continue

MATRIX OF CORRELATION COEFFICIENTS

	INCOME	EDUC	COLLEGE
INCOME	1.0000	0.1979	0.6239
EDUC	0.1979	1.0000	0.3698
COLLEGE	0.6239	0.3698	1.0000

Press any key to continue

A N O V A T A B L E

Source of Variation	Sum of Squares	D.F.	Mean Square
Regression	3.174638E+07	2	1.587319E+07
Error	4.954756E+07	47	1054204
Total	8.129394E+07	49	

F for analysis of variance = 15.06 (d.f. = 2 and 47)
R-Squared = .3905
Per cent of variation explained = 39.05
Multiple correlation coefficient = 0.6249
Standard error of estimate = 1026.744

TABLE OF ESTIMATED COEFFICIENTS

Variable	Estimated Coefficient	Estimated St. Dev.	Computed t-Value
EDUC	-65.79314	212.31609	-0.310
COLLEGE	271.931	52.244	5.205

Intercept = 5100.539

Complete table of actual and estimated values (y/n)?

TABLE OF ACTUAL AND ESTIMATED INCOME VALUES

Case	Observed	Estimated	Residual
1	7488	8243.96	-755.96
2	12790	10645.71	2144.29
3	8791	9372.91	-581.91
4	7268	7448.78	-180.78
5	10938	10221.59	716.41
6	10025	11032.56	-1007.56
7	11720	10615.46	1104.54
8	10339	9210.62	1128.38
9	8996	8861.07	134.93
10	8073	8991.33	-918.33
11	10101	10350.98	-249.98
12	8056	9182.55	-1126.55
13	10521	8773.78	1747.22
14	8936	8209.31	726.69
15	9358	8625.54	732.46
16	9983	9119.84	863.16
17	7613	7822.03	-209.03
18	8458	8468.08	-10.08

Press any key to continue

19	7925	8585.18	-660.18
20	10460	10188.70	271.30
21	10125	10203.61	-78.61
22	9950	8878.60	1071.40
23	9724	9312.82	411.18
24	6580	8306.67	-1726.67
25	8982	8664.13	317.87
26	8536	9429.92	-893.92
27	9365	9195.71	169.29
28	10727	8956.68	1770.32
29	9131	9840.89	-709.89
30	10924	9822.91	1101.09
31	7841	9436.50	-1595.50
32	10260	9830.36	429.64
33	7819	8441.76	-622.76
34	8747	8957.55	-210.55
35	9462	8855.36	606.64
36	9116	9080.36	35.64

Press any key to continue

TABLE OF ACTUAL AND ESTIMATED INCOME VALUES

Case	Observed	Estimated	Residual
37	9317	9442.20	-125.20
38	9434	8557.11	876.89
39	9444	8965.01	478.99
40	7266	8639.57	-1373.57
41	7806	8659.31	-853.31
42	7720	8066.76	-346.76
43	9545	9175.10	369.90
44	7649	10278.61	-2629.61
45	7827	10054.49	-2227.49
46	9392	10045.28	-653.28
47	10309	9897.03	411.97
48	7800	7633.43	166.57
49	9348	8843.08	504.92
50	10898	9442.20	1455.80

Do you want tests of regression assumptions (y/n)?

..... TEST 1: NORMALITY OF ERRORS .....

f(o)	f(e)	z Scale and Histogram
0	0.1	-3+ |
2	1.1	-2+ | **
4	6.8	-1+ | ****
18	17.1	0+ | ******************
18	17.1	1+ | ******************
7	6.8	2+ | *******

0 0.1 1

Chi-Square = 0.574 with d.f. = 1

Note: First and last 3 classes collapsed to enlarge f(e).
Press any key to continue

..... TEST 2: AUTOCORRELATION OF ERRORS .....

Correlation of e(i) with e(i-1) = -.013
Computed t for autocorrelation = -0.091 with d.f. = 46
Durbin-Watson = 1.984

..... TEST 3: HETEROSKEDASTICITY OF ERRORS .....

Group	# Obs. in Group	Variance of Residuals for Group
1	12	979631.3
2	13	755478.4
3	12	768788.9
4	13	1441947

Bartlett's Chi-Square = 0.771 with d.f. = 3
(using 4 groups)

Press any key to continue

MATRIX OF CORRELATION COEFFICIENTS

	EDUC	INCOME	COLLEGE
EDUC	1.0000	-0.0353	0.3168
INCOME	-0.0353	1.0000	-0.0282
COLLEGE	0.3168	-0.0282	1.0000

Press any key to continue

A N O V A T A B L E 11

Source of Variation	Sum of Squares	D.F.	Mean Square

Error	24.35411	47	.5181724
Total	27.0912	49	

F for analysis of variance = 2.64 (d.f. = 2 and 47)
R-Squared = .1010
Per cent of variation explained = 10.10
Multiple correlation coefficient = 0.3179
Standard error of estimate = .719842

Press any key to continue

TABLE OF ESTIMATED COEFFICIENTS

Variable	Estimated Coefficient	Estimated St. Dev.	Computed t-Value
INCOME	-14.84569	77.77115	-0.191
COLLEGE	0.000292	0.000128	2.284

Intercept = 1.935684

Complete table of actual and estimated values (y/n)?

TABLE OF ACTUAL AND ESTIMATED EDUC VALUES

Case	Observed	Estimated	Residual
1	4.3	4.342295	-0.042295
2	8.3	5.028927	3.271073
3	4.5	4.686361	-0.186361
4	4.4	4.117412	0.282588
5	4	5.006603	-1.006603
6	4.9	5.185351	-0.285351
7	3.8	5.005599	-1.205599
8	4.9	4.638987	0.261014
9	3.6	4.522444	-0.922444
10	4.1	4.560471	-0.460471
11	4.1	4.986382	-0.886382
12	4.5	4.630793	-0.130793
13	4.1	4.496964	-0.396964
14	4	4.332180	-0.332180

17	4.1	4.226372	-0.126372
18	4.2	4.407722	-0.207722

Press any key to continue

TABLE OF ACTUAL AND ESTIMATED EDUC VALUES

Case	Observed	Estimated	Residual
19	4.9	4.456405	0.443595
20	4.5	4.895515	-0.395515
21	5.1	4.928863	0.171137
22	5.4	4.542062	0.857938
23	5	4.668819	0.331181
24	5	4.375101	0.624899
25	3.7	4.464955	-0.764955
26	5.7	4.717503	0.982497
27	4.3	4.634634	-0.334634
28	3.8	4.550356	-0.750356
29	4	4.808479	-0.808479
30	5.1	4.832225	0.267775
31	5.6	4.719423	0.880577
32	5.4	4.834401	0.565599
33	4.6	4.400039	0.199961
34	4.2	4.565110	-0.365110
35	4.1	4.520779	-0.420779
36	4.4	4.586462	-0.186462

Press any key to continue

TABLE OF ACTUAL AND ESTIMATED EDUC VALUES

Case	Observed	Estimated	Residual
37	5.1	4.721088	0.378912
38	4.5	4.448211	0.051789
39	4.5	4.552788	-0.052788
40	4.9	4.472282	0.427718
41	4.6	4.463546	0.136454
42	4.1	4.290568	-0.190568
43	4.2	4.628616	-0.428617
44	5.2	4.936260	0.263740
45	5.3	4.812843	0.487157
46	4.2	4.853647	-0.653647
47	4.8	4.839366	-0.039365
48	4.9	4.185813	0.714187
49	4.7	4.531692	0.168308
50	5.1	4.721088	0.378912

Do you want tests of regression assumptions (y/n)?

..... TEST 1: NORMALITY OF ERRORS .....

f(o)	f(e)	z Scale and Histogram
0	0.1	|
		-3+

```
                -2+
   8      6.8     | ********
                -1+
  19     17.1     | ********************
                 0+
  19     17.1     | ********************
                 1+
   3      6.8     | ***
                 2+
   0      1.1     |
                 3+
   1      0.1     | *

     Chi-Square =    2.388 with d.f. =  1

Note: First and last 3 classes collapsed to enlarge f(e).
     Press any key to continue


...... TEST 2: AUTOCORRELATION OF ERRORS ......

   Correlation of e(i) with e(i-1) = 0.012
   Computed t for autocorrelation =     0.083 with d.f. =   46
   Durbin-Watson =   1.970

...... TEST 3: HETEROSKEDASTICITY OF ERRORS ......

        # Obs. in   Variance of
Group   in Group   Residuals for Group
-----   --------   -----------------
 1        12          1.274857
 2        13          .2478039
 3        12          .3324718
 4        13          .1419008

   Bartlett's Chi-Square =   7.504 with d.f. =  3
   (using  4  groups)

     Press any key to continue



TABLE OF MEANS AND STANDARD DEVIATIONS

Variable         Mean            St.Dev.
--------       ---------       ---------
COLLEGE         9177.663        804.9141
EDUC            4.624           .7435601
INCOME        -6.152344E-04     1.322799E-03

Wait ... inverting the matrix ...

     Press any key to continue
```

MATRIX OF CORRELATION COEFFICIENTS

	COLLEGE	EDUC	INCOME
COLLEGE	1.0000	0.3168	-0.0282
EDUC	0.3168	1.0000	-0.0353
INCOME	-0.0282	-0.0353	1.0000

Press any key to continue

A N O V A T A B L E

Source of Variation	Sum of Squares	D.F.	Mean Square
Regression	3194548	2	1597274
Error	2.85519E+07	47	607487.1
Total	3.174644E+07	49	

F for analysis of variance = 2.63 (d.f. = 2 and 47)
R-Squared = .1006
Per cent of variation explained = 10.06
Multiple correlation coefficient = 0.3172
Standard error of estimate = 779.4146

Press any key to continue

A N O V A T A B L E

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Regression	3194548	2	1597274
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Total	3.174644E+07	49	

R-Squared = .1006
Per cent of variation explained = 10.06
Multiple correlation coefficient = 0.3172
Standard error of estimate = 779.4146

Press any key to continue

TABLE OF ESTIMATED COEFFICIENTS

Variable	Estimated Coefficient	Estimated St. Dev.	Computed t-Value
EDUC	342.242	149.839	2.284
INCOME	-10391.51	84226.34	-0.123

Intercept = 7588.744

Complete table of actual and estimated values (y/n)?

TABLE OF ACTUAL AND ESTIMATED COLLEGE VALUES

Case	Observed	Estimated	Residual
1	8243.956	9060.38	-816.43
2	10645.71	10419.20	226.51
3	9372.907	9138.98	233.93
4	7448.777	9099.68	-1650.90
5	10221.6	9018.60	1203.00
6	11032.56	9286.02	1746.54
7	10615.46	8868.97	1746.49
8	9210.625	9275.88	-65.25
9	8861.065	8820.81	40.25
10	8991.328	8991.94	-0.61
11	10350.98	9012.23	1338.75
12	9182.556	9138.98	43.58
13	8773.783	8991.94	-218.15
14	8209.308	8957.71	-748.40
15	8625.536	9207.43	-581.89
16	9119.838	8889.26	230.58
17	7822.025	8997.01	-1174.98
18	8468.08	9026.16	-558.08

TABLE OF ACTUAL AND ESTIMATED COLLEGE VALUES

Case	Observed	Estimated	Residual
19	8585.184	9275.88	-690.69
20	10188.7	9118.68	1070.02
21	10203.61	9344.33	859.29
22	8878.606	9447.00	-568.39
23	9312.818	9310.10	2.72
24	8306.674	9310.10	-1003.43
25	8664.135	8855.04	-190.90
26	9429.922	9559.82	-129.90
27	9195.715	9070.53	125.18
28	8956.68	8889.26	67.42
29	9840.893	8957.71	883.18
30	9822.908	9354.47	468.44
31	9436.501	9525.59	-89.09
32	9830.363	9457.15	373.22
33	8441.763	9163.06	-721.29
34	8957.556	9036.31	-78.75
35	8855.362	8991.94	-136.57
36	9080.362	9094.61	-14.25

Press any key to continue

TABLE OF ACTUAL AND ESTIMATED COLLEGE VALUES

Case	Observed	Estimated	Residual
37	9442.205	9354.47	87.73
38	8557.115	9138.98	-581.86
39	8965.011	9128.83	-163.82
40	8639.57	9275.88	-636.31
41	8659.308	9163.06	-503.75
42	8066.763	8991.94	-925.17
43	9175.101	9036.31	138.79
44	10278.61	9368.40	910.21
45	10054.49	9362.03	692.46
46	10045.28	9016.01	1029.27
47	9897.031	9241.65	655.38
48	7633.426	9280.95	-1647.52
49	8843.08	9207.43	-364.35
50	9442.205	9354.47	87.73

Do you want tests of regression assumptions (y/n)?

..... TEST 1: NORMALITY OF ERRORS .....

f(o)	f(e)	z Scale and Histogram
0	0.1	-3+
2	1.1	-2+ **
4	6.8	-1+ ****

```
   15     17.1      | ****************
                  1+
.   7.     6.8      | *******
                  2+
    2      1.1      | **
                  3+
    0      0.1      |

      Chi-Square =    1.369 with d.f. =  1

Note: First and last 3 classes collapsed to enlarge f(e).
     Press any key to continue


...... TEST 2: AUTOCORRELATION OF ERRORS ......

   Correlation of e(i) with e(i-1) = 0.222
   Computed t for autocorrelation =     1.546 with d.f. =   46
   Durbin-Watson =   1.555

...... TEST 3: HETEROSKEDASTICITY OF ERRORS ......

        # Obs. in   Variance of
Group   in Group    Residuals for Group
-----   --------   ------------------
 1      12          1070494
 2      13          493711.5
 3      12          144731.4
 4      13          580841.1

   Bartlett's Chi-Square =   4.455 with d.f. =  3
   (using  4  groups)

     Press any key to continue



TABLE 1: SUMS
-------------------
File for X    COLLEGE
File for Y    INCOME
Sum X          458883.2
Sum Y         -3.076172E-02
Sum X*X        4.243221E+09
Sum Y*Y        1.046658E-04
Sum X*Y       -283.7945

Mean of X = 9177.663
Mean of Y =-6.152344E-04


     Press any key to continue
```

TABLE 2: STANDARD DEVIATIONS

Standard Deviation of:	Universe Formula	Sample Formula
X	796.8242	804.9141
Y	.00131	.001323
Residuals	.001309	.001336
Slope	2.323197E-07	2.371103E-07
Intercept	.00214	.002184

Press any key to continue

..... TEST 2: AUTOCORRELATION OF RESIDUALS .....

Correlation of e(i) with e(i-1) = 0.147
Computed t for autocorrelation is 1.022 with d.f. = 47
Durbin-Watson test statistic = 1.69

..... TEST 3: HETEROSKEDASTICITY OF RESIDUALS .....

Group	# Obs. in Group	Variance of Residuals for Group
1	12	0.00000
2	13	0.00000
3	12	0.00000
4	13	0.00000

Bartlett's Chi-Square = 6.302 with d.f. = 3

Where now: E=EXPLORE menu R=Run BIGRES again X=exit ?
Where now: E=EXPLORE menu R=Run BIGRES again X=exit ?

SUMMARY OF THE 'FIT' OF THE BIVARIATE REGRESSION

Estimated standard error of slope = 2.371103E-07
Estimated standard error of intercept = .002184

Computed t value for slope = -0.196
Computed t value for intercept = -0.087

Correlation coefficient = 0.0282
R-Squared = 0.0008
Per cent of variation explained = 0.08
Estimated standard error of estimate = .001336

TABLE OF MEANS AND STANDARD DEVIATIONS

Variable	Mean	St.Dev.
INCOME	-6.152344E-04	1.322799E-03
SPEND	1688.94	704.7817
PUPIL	18.914	2.339459

Wait ... inverting the matrix ...

Press any key to continue

MATRIX OF CORRELATION COEFFICIENTS

	INCOME	SPEND	PUPIL
INCOME	1.0000	0.0362	-0.1891
SPEND	0.0362	1.0000	-0.1521
PUPIL	-0.1891	-0.1521	1.0000

Press any key to continue

ANOVA TABLE

Source of Variation	Sum of Squares	D.F.	Mean Square
Regression	3.070094E-06	2	1.535047E-06
Error	8.267001E-05	47	1.758936E-06
Total	8.574011E-05	49	

F for analysis of variance = 0.87 (d.f. = 2 and 47)
R-Squared = .0358
Per cent of variation explained = 3.58
Multiple correlation coefficient = 0.1892
Standard error of estimate = 1.326249E-03

Press any key to continue

TABLE OF ESTIMATED COEFFICIENTS

Variable	Estimated Coefficient	Estimated St. Dev.	Computed t-Value
SPEND	1.437691E-08	2.719929E-07	0.053
PUPIL	-0.000106	0.000082	-1.297

Intercept = 1.370099E-03

Complete table of actual and estimated values (y/n)?

TABLE OF ACTUAL AND ESTIMATED INCOME VALUES

Case	Observed	Estimated	Residual
1	0	-0.001118	0.001118
2	9.765625E-04	-0.000378	0.001355
3	-9.765625E-04	-0.000669	-0.000308
4	-4.882813E-04	-0.000631	0.000143
5	-5.859375E-03	-0.000814	-0.005046
6	-1.953125E-03	-0.000583	-0.001370
7	1.953125E-03	-0.000318	0.002271
8	-9.765625E-04	-0.000442	-0.000535
9	0	-0.000842	0.000842
10	0	-0.000799	0.000799
11	-1.953125E-03	-0.001088	-0.000865

14	0	-0.000769	0.000769
15	-9.765625E-04	-0.000380	-0.000597
16	0	-0.000328	0.000328
17	-4.882813E-04	-0.000787	0.000299
18	0	-0.000509	0.000509

Press any key to continue

TABLE OF ACTUAL AND ESTIMATED INCOME VALUES

Case	Observed	Estimated	Residual
19	-9.765625E-04	-0.000862	-0.000114
20	9.765625E-04	-0.000580	0.001557
21	-9.765625E-04	-0.000187	-0.000789
22	-9.765625E-04	-0.000687	-0.000289
23	-9.765625E-04	-0.000473	-0.000504
24	-9.765625E-04	-0.000597	-0.000379
25	0	-0.000513	0.000513
26	-1.953125E-03	-0.000368	-0.001585
27	-9.765625E-04	-0.000276	-0.000701
28	0	-0.000845	0.000845
29	0	-0.000534	0.000534
30	-1.953125E-03	-0.000369	-0.001584
31	-1.953125E-03	-0.000678	-0.001275
32	-1.953125E-03	-0.000585	-0.001368
33	0	-0.000779	0.000779
34	-9.765625E-04	-0.000261	-0.000716
35	0	-0.000734	0.000734
36	0	-0.000480	0.000480

Press any key to continue

TABLE OF ACTUAL AND ESTIMATED INCOME VALUES

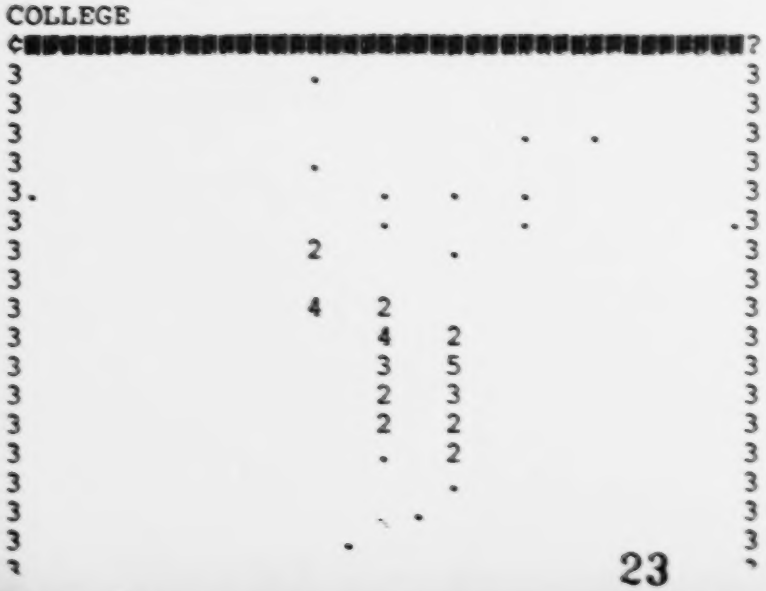
Case	Observed	Estimated	Residual
37	-1.953125E-03	-0.000611	-0.001342
38	-9.765625E-04	-0.000479	-0.000498
39	0	-0.000379	0.000379
40	-9.765625E-04	-0.000832	-0.000144
41	0	-0.000360	0.000360
42	0	-0.000853	0.000853
43	-9.765625E-04	-0.000597	-0.000379
44	0	-0.001433	0.001433
45	3.90625E-03	-0.000179	0.004086
46	9.765625E-04	-0.000532	0.001509
47	-9.765625E-04	-0.000889	-0.000088
48	-1.464844E-03	-0.000648	-0.000817
49	-9.765625E-04	-0.000495	-0.000481
50	-1.953125E-03	-0.000541	-0.001412

Do you want tests of regression assumptions (y/n)?

..... TEST 1: NORMALITY OF ERRORS .....

f(o)	f(e)	z Scale and Histogram
1	0.1	| *
		-3+

```
                -2+
   6     6.8      | ******
                -1+
  19     17.1     | ********************
                 0+
  18     17.1     | ********************
                 1+
   5     6.8      | *****
                 2+
   0     1.1      |
                 3+
   1     0.1      | *

     Chi-Square =    0.851 with d.f. =  1

Note: First and last 3 classes collapsed to enlarge f(e).
     Press any key to continue


..... TEST 2: AUTOCORRELATION OF ERRORS .....

   Correlation of e(i) with e(i-1) = 0.178
   Computed t for autocorrelation =     1.225 with d.f. =   46
   Durbin-Watson =   1.620

..... TEST 3: HETEROSKEDASTICITY OF ERRORS .....

        # Obs. in   Variance of
Group   in Group    Residuals for Group
-----   --------   ------------------
 1      12          3.174773E-06
 2      13          4.259442E-07
 3      12          1.141455E-06
 4      13          1.949075E-06

   Bartlett's Chi-Square =   5.090 with d.f. =  3
   (using  4  groups)

     Press any key to continue
```



INCOME

Where now: E=EXPLORE menu R=Run PLOT again X=exit ?